RCA
Radiola 41
SERVICE NOTES

RCA Radiola 41

Regular Edition—25M

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A WORD OR TWO ABOUT SERVICE

Service goes hand in hand with sales. The well-informed RCA Authorized Dealer renders service at time of sale in affording information as to proper installation and upkeep. Subsequent service and repair may be required by reason of wear and tear and mishandling, to the end that RCA Loudspeaker and Radiola owners may be entirely satisfied.

Obviously, this service can best be rendered by properly equipped service organizations having a thoroughly trained personnel with a knowledge of the design and operation of RCA Loudspeakers and Radiolas.

Such service organizations have been established by RCA Distributors, and RCA Authorized Dealers are advised to refer any major work or replacement to their selected Distributors. Minor replacements and mechanical and electrical adjustments may be undertaken by the RCA Dealer.

To assist in promoting this phase of the Dealer and Distributor's business the RCA Service Division has prepared a series of Service Notes—of which this booklet is a part—containing technical information and practical helps in servicing RCA Loudspeakers and Radiolas.

This information has been compiled from experience with RCA Dealers and Distributors' service problems and presents the best practice in dealing with them. A careful reading of these Service Notes will establish their value, and it is suggested they be preserved for ready reference.

In addition to supplying the Service Notes, the RCA Service Division maintains a corps of engineers who are qualified to render valuable help in solving service problems. These engineers call upon the trade at frequent intervals to advise and assist RCA Distributors in the performance of service work.

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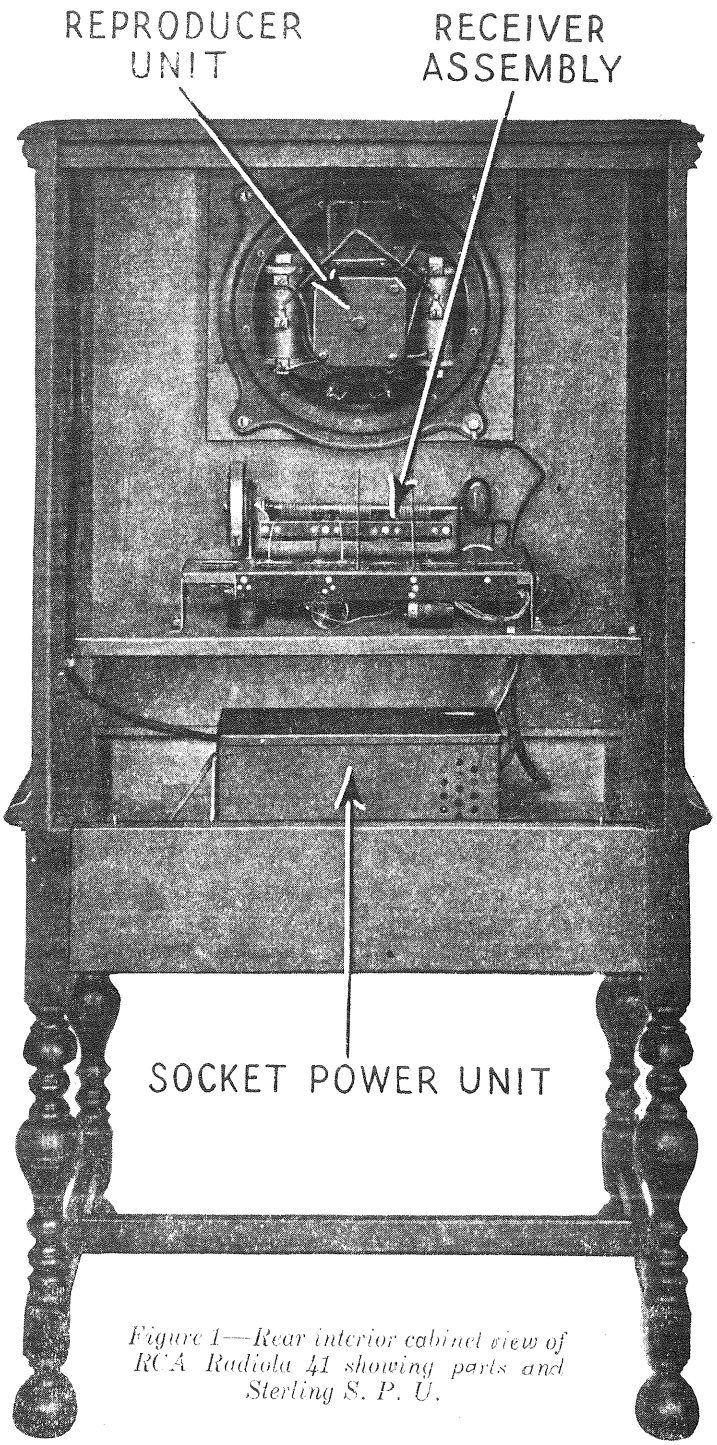

Figure 1—Rear interior cabinet view of RCA Radiola 41 showing parts and Sterling S. P. U.

RCA RADIOLA 41

(105-125 Volts. 50-60 Cycle A. C.)

SERVICE NOTES

Prepared by RCA Service Division

RCA Radiola 41 is a six-tube tuned radio-frequency receiver employing four Radiotrons UX-226, one Radiotron UY-227, one Radiotron UX-210 and one Radiotron rectifier UX-280 in the socket power unit. Combined with the receiver in the console cabinet is a new dynamic speaker, giving exceptional tone quality to the output from the receiver assembly

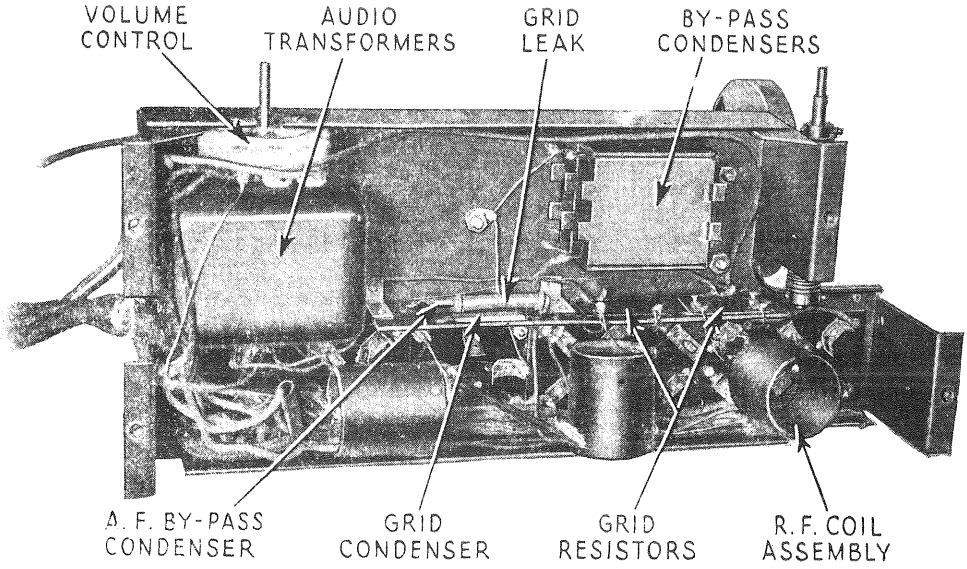

Figure 2—Sub-chassis view of receiver assembly showing parts

A disc type rectifier furnishes direct current of the proper voltage for field supply to the reproducer unit. Figure 1 is a rear interior view.

This combination of a tuned R. F. receiver (Figure 2) with a Radiotron UX-210 power amplifier and the new dynamic reproducer unit results in a radio receiver of excellent sensitivity, selectivity, volume and tone quality.

Radiola 41 is designed to operate on alternating current of 105 to 125 volts, 50 to 60 cycles, such as is used for house lighting. Connection to D. C. lines or to A. C. lines of different rating may damage the Radiola or the Radiotrons.

Radiola 41 is also made in models designed for 105-125 volts, 25-40 cycles A. C. operation. In this model the power transformer is different from that used in the 50-60 cycle models. All other parts are identical in both models and the Service Notes apply to each equally well.

The following design characteristics are incorporated in Radiola 41:

(a) The circuit consists of one untuned coupling stage, two tuned radio frequency stages, a tuned detector and two audio stages—the last stage using Radiotron UX-210 as a power amplifier.

(b) The volume control regulates the input grid voltage to the coupling stage. This gives a smooth control of volume without distortion.

(c) Grid resistances in the two tuned radio frequency stages effectively prevent any tendency to self oscillation in these circuits.

(d) A new type dynamic reproducer unit similar to that in Loudspeaker 106 is used.

(e) Field current for the dynamic speaker is supplied by a full wave disc rectifier, mounted directly on the reproducer unit. There is also mounted on the reproducer unit a suitable output transformer for coupling the output from Radiotron UX-210 to the low impedance cone coil on the reproducer unit. Two .1 mfd. condensers

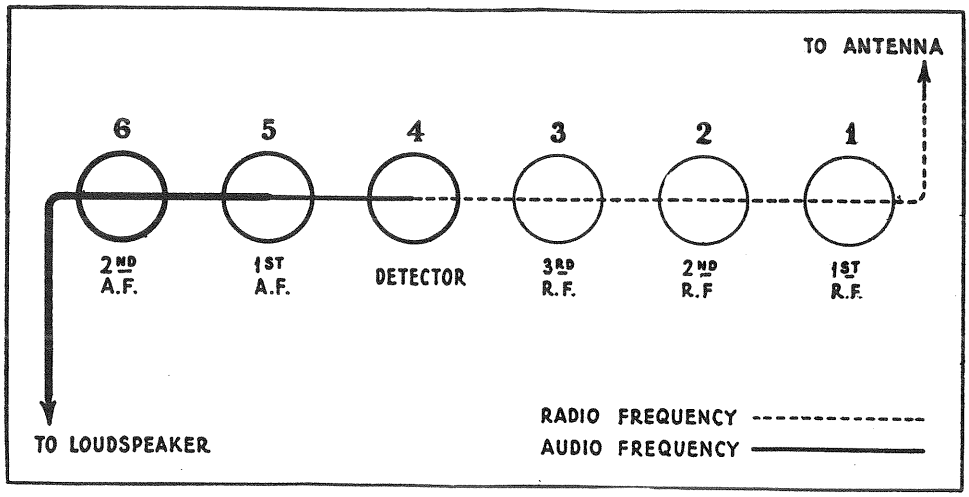

Figure 3—Radiotron sequence

connected together in series with their mid-point grounded are provided to prevent any possible R. F. current, set up in the rectifier, from affecting the receiver.

Figure 3 illustrates the electrical sequence of the Radiotrons used in the receiver assembly.

Radiotron No. 1 is an untuned stage of radio frequency amplification. It is coupled directly to the antenna and ground by the volume control.

Radiotron No. 2 is a stage of tuned R. F. amplification employing a grid resistance to prevent oscillation. It is tuned by the first gang condenser.

Radiotron No. 3 is the second stage of tuned R. F. amplification. It also employs a grid resistance for the purpose of stabilizing or preventing self oscillation in the circuit. It is tuned by the second of the main tuning condensers.

Radiotron No. 4 is the detector, tuned by the third gang condenser.

Radiotrons No. 5 and No. 6 are respectively the first and second stages of audio frequency amplification. The last stage, Radiotron No. 6, employs power amplifier Radiotron UX-210.

PART I—INSTALLATION

[1] ANTENNA (Outdoor Type)

Due to the sensitivity of Radiola 41 the antenna length need only be 25 to 50 feet. It should be erected as high as possible and be removed from all obstructions. The lead-in should be a continuation of the antenna itself, thus avoiding all splices which might introduce additional resistance and, in time, corrode sufficiently to seriously affect reception. If it is absolutely necessary to splice the lead-in to the antenna the joint must be carefully soldered to insure a good electrical contact. Clean off all excess flux and tape the connection, to protect it from the oxidation effects of the atmosphere.

High-grade glass or porcelain insulator supports are required, and at no point should the antenna or lead-in wire come in contact with any part of the building. Bring the lead-in wire from the outside through a porcelain tube insulator to the inside of the house for connection to the receiver.

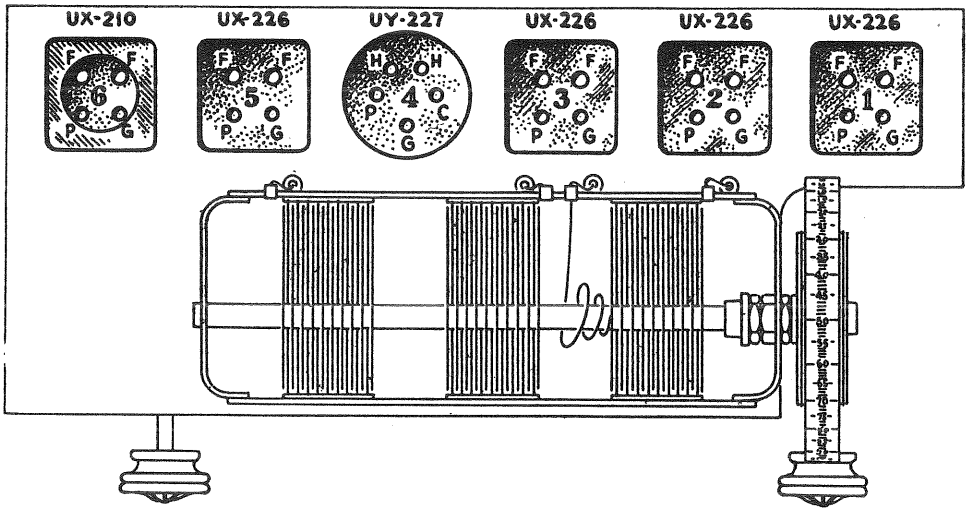

Figure 4—Radiotron socket contacts

The antenna should not cross either over or under any electric light, traction, or power line and should be at right angles to these lines and other antennas. An outdoor antenna should be protected by means of an approved lightning arrester, in accordance with the requirements of the National Fire Underwriters' Code.

[2] ANTENNA (Indoor Type)

Where the installation of an outdoor antenna is not practical, satisfactory results may generally be obtained by using an indoor antenna of about 25 to 40 feet of insulated wire strung around the picture moulding or placed under a rug. In buildings where metal lathing is employed, satisfactory results are not always possible with this type of antenna. However, due to its sensitivity, Radiola 41 will generally give entirely satisfactory reception with an indoor antenna.

[3] GROUND

A good ground is quite as important as a good antenna. Nc specific recommendations can be given in this matter as conditions vary in different locations. Water and steam pipes usually make good grounds. Gas pipes usually make poor grounds and, as a rule, are to be avoided. If neither water nor steam pipes are available, a pipe or metal rod may be driven into the ground to a depth of several feet. The success of this type of ground depends upon the moisture present in the soil. The ground lead should be connected by means of an approved ground clamp to a section of pipe that has been scraped and thoroughly cleaned. The connection should be inspected from time to time to make certain that a clean and tight electrical contact exists between the clamp and pipe. The service man should experiment with various grounds, and employ the one giving the best results.

A spark will occur if the power supply is "on" when making the ground connection. This action is normal, being caused by the discharge of one of the **.1 mfd.** condensers connected across the power input to the disc rectifier. No current is consumed as no load is being drawn through the condenser.

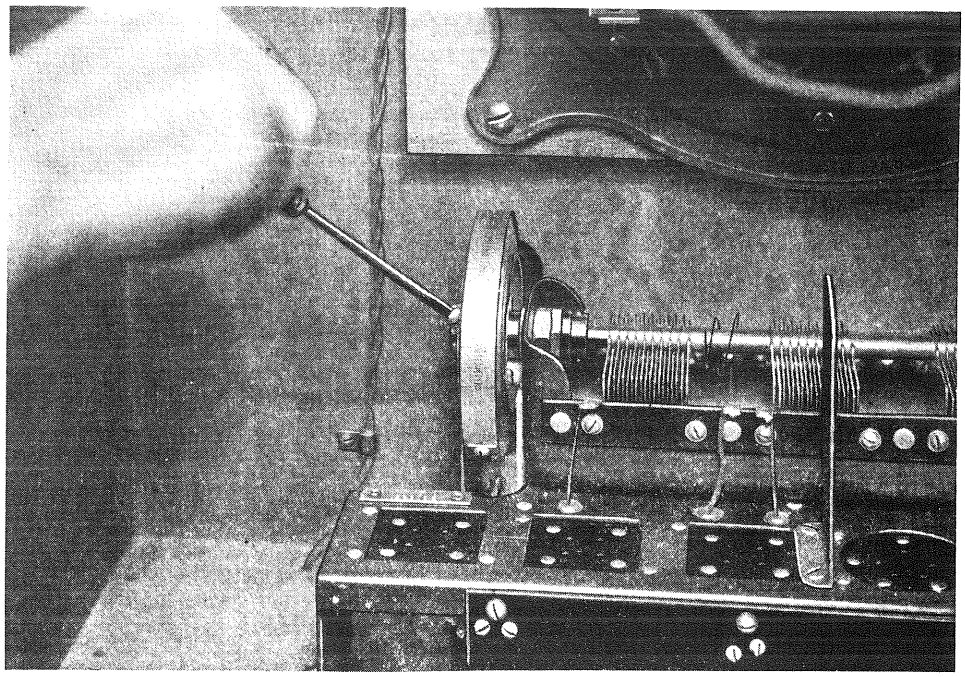

Figure 5—Tightening condenser drive cable

[4] RADIOTRONS

Radiotrons UX-226 are used in all radio frequency amplifying stages and in the first audio amplifying stage. It has an oxide coated filament consuming 1.05 amperes at 1.5 volts.

Radiotron UY-227 is used for the detector. It operates on raw A. C. for filament supply, making use of an indirectly heated cathode. This Radiotron has five prongs, the extra prong being connected to the oxide coated cathode.

Radiotron UX-210 is used in the last audio stage and provides ample power without distortion. Be careful not to insert any Radiotrons UX-226 in the UX-210 socket as immediate filament burnout will result.

Radiotron UX-280 (in the Socket Power Unit) is a full wave rectifying Radiotron used to rectify the alternating current into pulsating direct current, which is smoothed out by means of a filtering system, and used to provide all plate and biasing voltages.

[5] LOCATION OF RADIOLA IN ROOM

As with other musical instruments, the location of Radiola 41 in the room should be chosen with care. Various positions should be tried until the most desirable reproduction is obtained. If this position is outside the radius of the connection cord to the A. C. outlet, an extension cord can be used.

PART II—SERVICE DATA

[1] ANTENNA SYSTEM FAILURES

A grating noise may be caused by a poor lead-in connection to the antenna; or the antenna touching some metallic surface, such as the edge of a tin roof, drain pipe, etc. By disconnecting the antenna and ground leads the service man can soon determine whether the cause of complaint is within or external to the receiver and plan his service work accordingly

[2] RADIOTRON SOCKETS

The sockets in Radiola 41 are of the standard gang UX and UY type (Figure 4). The three-gang socket is for the radio frequency amplifiers; the single socket—a five-prong detector socket is for Radiotron UY-227 and the two-gang socket is for the audio frequency amplifiers. Care must be exercised when inserting Radiotrons in the sockets. A socket contact may not be in its correct position and forced insertion of a tube will bend or break it. If care is exercised and the Radiotron inserted gently, little trouble will be experienced with socket contacts. A bent one will be noticeable on inspection and may be corrected by inserting a narrow instrument in the socket hole and pushing the contact into its correct position. A badly bent or broken socket contact must be replaced.

[3] RADIOTRON PRONGS

Dirty Radiotron prongs may cause noisy operation or change the resistance of the filament circuit sufficiently to cause a hum in the loudspeaker. They should therefore be cleaned periodically to insure good contact.

The prongs should be cleaned by using a piece of fine sandpaper. The use of emery cloth or steel wool is not recommended. Before re-inserting Radiotrons in their sockets wipe the prongs and base carefully to make certain that all particles of sand are removed.

In placing Radiotrons in the UX sockets care should be exercised to make certain that the two large pins and two small pins of the Radiotrons match the socket holes. The UY-227 Radiotron has five prongs all of the same size and will fit in the socket only one way. If a Radiotron will not fit into a socket without considerable pressure being applied, look for excessive solder on one or more of the prongs. Excessive solder on prongs may be removed with a file or knife.

[4] LOOSE VOLUME CONTROL CONTACT ARM

A loose volume control contact may cause noisy or intermittent operation and should be remedied. If the contact arm is loose, the remedy is to bend it slightly so that it makes firm contact against the resistance strip. In order to do this it is necessary to remove the chassis from the cabinet as described in Part IV, Section 1. The volume control is then readily accessible. By removing the two screws that hold it to the metal frame it may be completely removed. The small U-shaped washer is removed from the shaft and the spring contact arm is pulled out to clear the resistor strip. The spring contact arm may now be bent sufficiently to make a good contact. After adjusting the spring contact arm, replace the mounting screws and return the chassis to the cabinet and replace screws and control knobs.

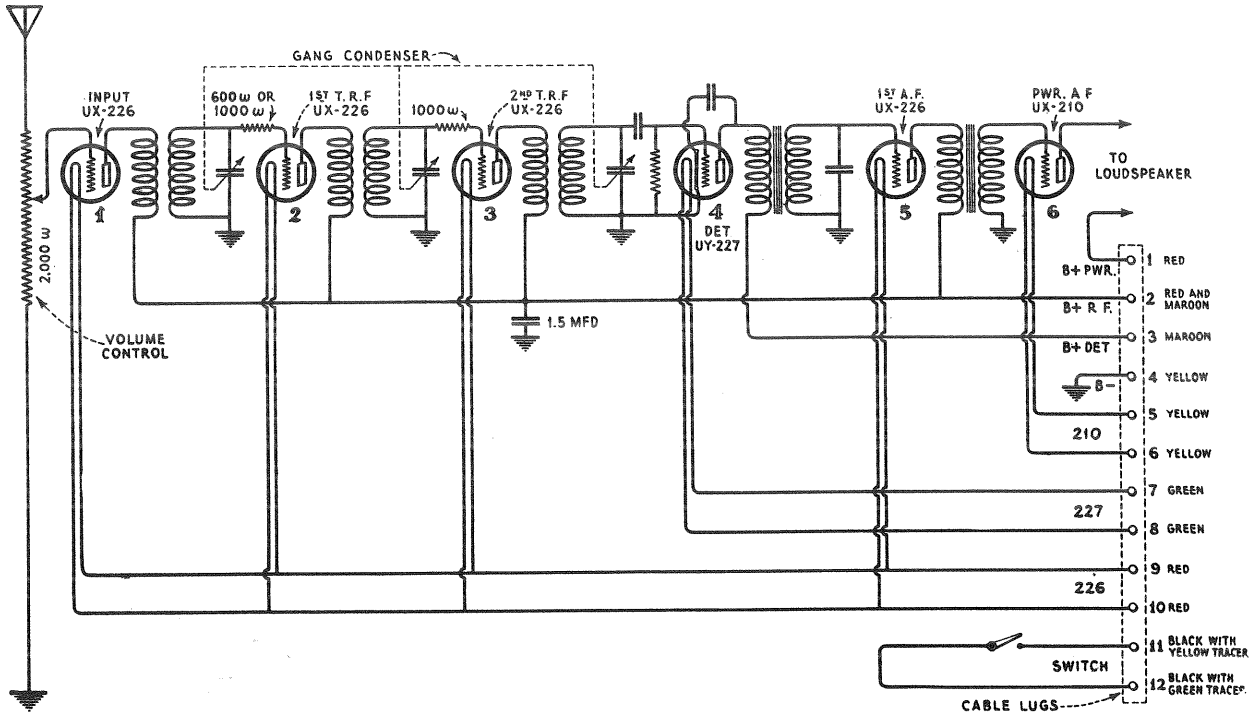

Figure 6—Schematic circuit diagram of the receiver assembly in Radiola 41

[5] ADJUSTMENT FOR SLACK DRUM CONTROL

The main tuning condensers are controlled by a cable and drum arrangement giving a smoothly acting vernier movement that has no back lash.

After considerable wear or extreme changes of temperature the cable may become slack. To take up this slack remove the back of the cabinet and turn the cable adjusting screw with clamp until the cable is taut (Figure 5). This screw may become seated after several adjustments are made, thus allowing no further tightening of the cable. When this condition occurs it will be necessary to slip the cable a half turn on the grooved drum. To make this adjustment it is necessary to remove the chassis from the cabinet as described in Part III, Section 1. Remove the cable adjusting screw and clamp. The cable will then have approximately one inch slack. By removing the tapered pin holding the front grooved drum to its shaft and replacing it on the opposite side (180 degrees) the one inch slack in the cable can be taken up by using the new position of the pin for anchoring the cable. It will be noted that the tapered pin in the new position cannot be inserted as far as originally. However, it can be inserted far enough to lock the grooved drum to the control shaft and clear the metal housing. If the cable again is stretched to the maximum adjustment of the cable adjusting screw the tapered pin can be returned to its original position and an additional half turn slipped on the drum which will provide for taking up all slack. A sufficient number of grooves are provided on the drum for this purpose.

[6] BROKEN CONDENSER DRIVE CABLE

A broken condenser drive cable can be replaced. See other RCA Service Notes for making this replacement. However, if a new cable is not immediately available a temporary repair can be made in the following manner, provided the break in the cable is not in that section that passes over the small grooved drums.

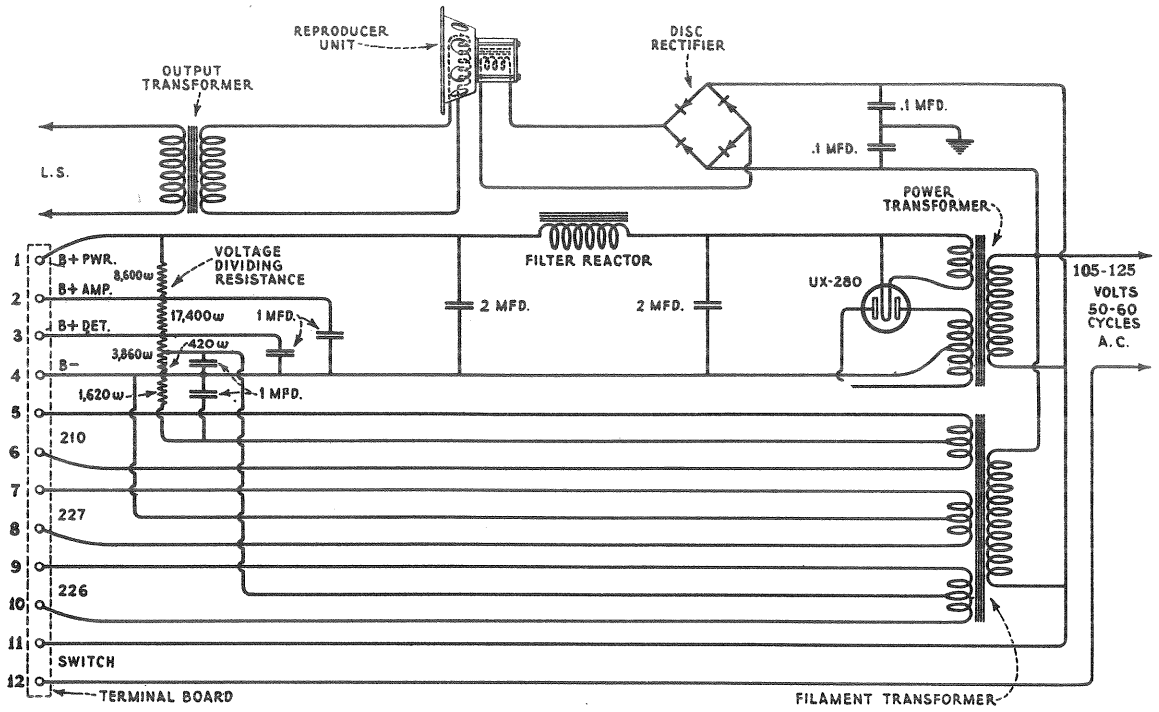

Figure 7—Schematic circuit diagram of Sterling S. P. U.

Splice and solder the two ends together. Splicing consists of interweaving the strands, as with rope, and not just twisting the cable ends together as in an electrical wiring splice Splicing gives greater strength and forms a smaller body on the cable. When soldering use plenty of flux and a small amount of solder. Heat sufficiently so that the solder adheres to all the strands of the cable. Placing the splice in an alcohol or bunsen flame affords sufficient heat and allows excess solder to drip away. This is but a temporary repair to be used only until a new cable can be procured.

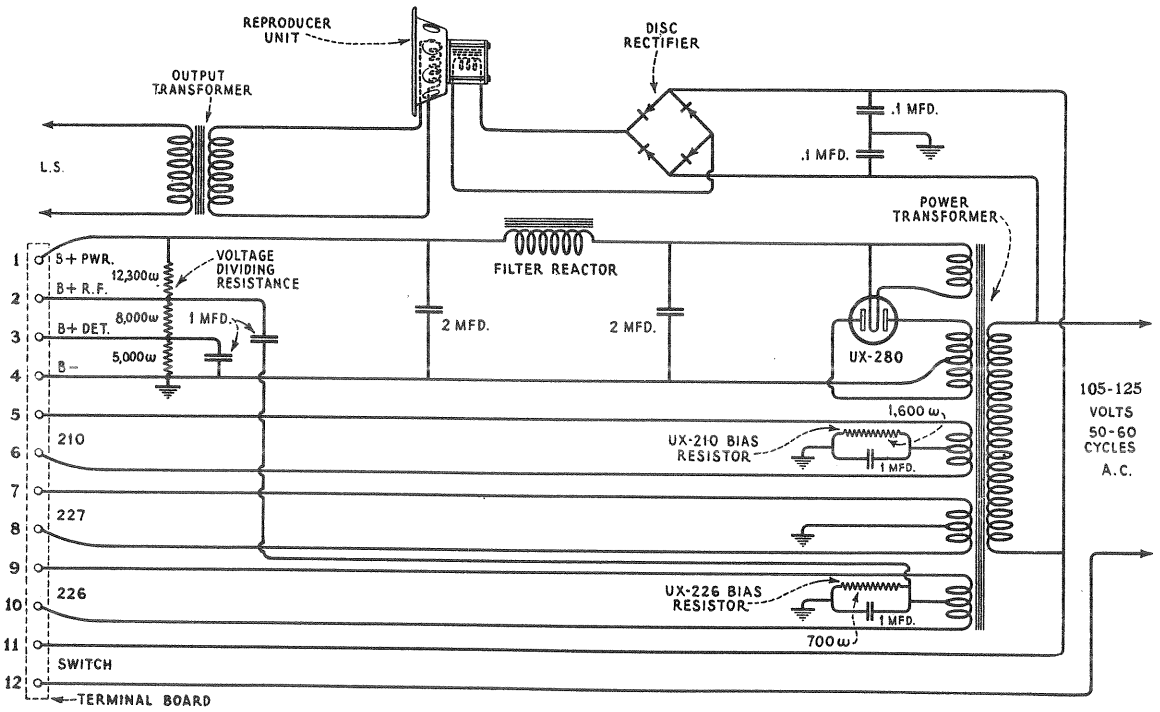

Figure 8—Schematic circuit diagram of Receptor S. P. U.

[7] HUM

Refer to the schematic circuits, Figures 6, 7 and 8, in connection with the following service data. If a pronounced hum develops look for:

(a) Low emission Radiotron UX-280. A low emission rectifying tube will cause excessive hum and faulty operation.

(b) Filament center taps not correctly placed. Should a center tap connection to one of the filament windings of the power transformer be off center, excessive hum will result. In this case the power transformer must be replaced or a center tapped resistance must be connected across the faulty winding and the center connection made to the resistance center.

(c) Antenna and ground leads reversed. This may occur either at their point of connection or at the volume control.

(d) Any of the several grounding leads in the Radiola not connected.

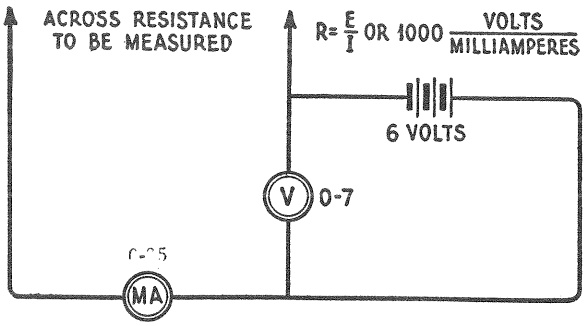

Figure 9—Schematic diagram of resistance measurement method

(e) Defective disc rectifier. This may be checked by removing Radiotron UX-210 and noting if the hum disappears. If it does not the trouble is in the disc rectifier and it must be replaced.

(f) Sometimes reversing the S. P. U. 180 degrees from its original position will reduce low frequency hum. This applies only to Receptor Units.

(g) A mechanical hum caused by loose laminations of the power transformer or filter reactor (Receptor only) may be eliminated by removing the S. P. U. from its container as described in Part III, Section 4, and tightening the clamps that hold the loose laminations until the hum disappears.

(h) Radiotron UY-227 shield not in place. Some models of Radiola 41 use a shield to entirely enclose the detector tube. Should this shield not be in place a high frequency hum may develop. In models not equipped with this shield that have excessive hum, the use of the shield may remedy this condition. A small can, such as a cocoa can, that will fit snugly over the tube shields already in place, and make connection to ground, may be used to check on this condition.

[8] DISTORTION IN REPRODUCER UNIT

Distortion in the reproducer unit may be due to any of the following causes.

(a) Cone out of alignment. Refer to Part II, Section 17.

(b) Leads from cone coil broken away from side of cone. Make these leads fast with a little shellac.

(c) Loose escutcheons, baffle board or rear cover. Any loose part in the cabinet will cause a rattle. Tighten all loose parts.

[9] LOW VOLUME AND WEAK SIGNALS

Low volume or weak signals may be caused by:

(a) Defective antenna system. A poor antenna and ground or one in a shielded locality may cause weak signals. The suggestions given in Part I, Sections 1, 2 and 3, should be followed if trouble of this kind is experienced.

(b) Defective Radiotrons. A defective Radiotron in any stage may cause weak signals. Before checking other causes it is a good plan to check all Radiotrons by interchanging them with ones of a similar type known to be in good operating condition.

(c) Defective A. F. transformers or output transformer. A defect in any of these parts will cause weak signals and abnormal operation. Check by means of the continuity test and make any replacement that is necessary.

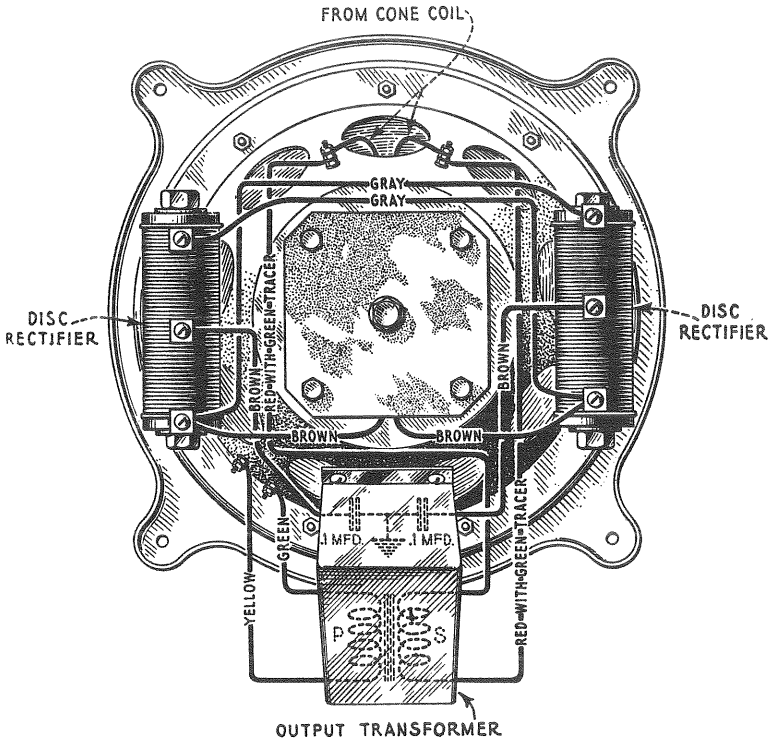

Figure 10—Wiring diagram of reproducer assembly

(d) Low voltage from S. P. U. Check S. P. U. voltages at terminal strip with readings given in Part II, Section 18. Low voltages may be caused by a low emission rectifying tube or defective resistances in the S. P. U. Check by means of continuity test.

(e) Open or short of various connections in receiver. Check by means of continuity tests and make any repair or replacement that is necessary.

(f) Defective loudspeaker field supply.

(g) Open loudspeaker field or connections.

(h) Grounded loudspeaker input terminals.

[10] AUDIO HOWL

Audio howl may be caused by:

(a) Open A. F. condenser connections. An open of either of the A. F. by-pass condensers may cause a howl.

(b) Open large by-pass condenser connections. An open of the connections to the large by-pass condensers may cause a howl.

(c) Defective volume control resistance. Should there be an open or short in the volume control or in its adjacent resistances an audio howl may develop.
(d) Vibrating elements in receiver Radiotrons. A gradually developed howl may be due to the loudspeaker causing the receiver Radiotron elements to vibrate. To overcome this condition, interchange the Radiotrons in the receiver, especially the detector.
(e) Poor ground. Install ground system as suggested in Part I, Section 3.
(f) Poorly soldered or corroded joints. Any high resistance joint throughout the Radiola may cause a howl.
(g) Defective resistance in S. P. U. or the receiver assembly. An open resistance unit may cause howl. Under such conditions it is advisable to turn the set "off" until the trouble is found, otherwise excessive voltage rise may cause further damage.
(h) Open of any of the several ground leads in the Radiola. This may cause some of the circuits to go into oscillation and result in a howl when a station is tuned "in."

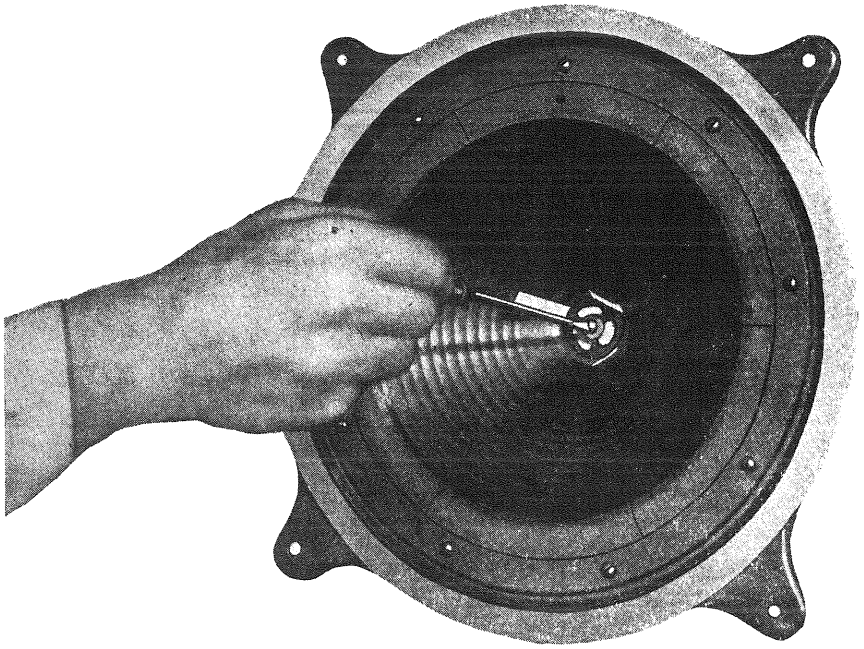

Figure 11—Centering reproducer cone

Generally a loud hum will also be present. The several grounding leads in the Receiver Assembly and in the Socket Power Unit should be checked and any open or poorly soldered joint should be repaired.
(i) Defective grid leak or open grid connection in the Radiola, except Radiotron UX-280.

[11] DISTORTED REPRODUCTION

Under normal conditions Radiola 41 will deliver a strong signal of good quality to the loudspeaker. If the loudspeaker reproduction is poor test the output from the receiver. A pair of phones may be used for this purpose. Poor quality or distortion may be due to any of the following causes:

(a) High or low plate and grid voltages from socket power unit. This may be due to a defective Radiotron UX-280 or tapped resistance unit. The remedy is to replace the Radiotron UX-280 with one of known quality or check the various resistances of the tapped resistor for a possible short or open.

(b) Defective Radiotrons. Though the Radiola may be in operating condition a defective Radiotron in any stage will cause distortion. This is especially true of the detector, 1st and 2nd audio stages and the rectifier tube.

(c) Defective A. F. transformer. Check by means of continuity tests and replace if necessary.

Should Radiola 41 become noisy in operation or signals come in and die out abruptly with periods of hum or no reception, test in the following manner:

(a) Disconnect antenna and ground leads. If the Radiola becomes quiet and signals from local stations are received, though weak, the trouble is either in the antenna system or is caused by nearby interfering electrical apparatus. The remedy in the first case is to repair the antenna system and in the second connect Radio Frequency chokes on any offending nearby apparatus.

(b) If disconnecting the antenna and ground system does not eliminate the noise the trouble is in the Radiola. A defective tube, one having poorly welded elements would cause a disturbance of this kind and this point should be checked by interchanging the Radiotrons in the Radiola with others of the same type. If it is definitely established that the Radiotrons are O. K. then the contact between the Radiotron prongs and the socket contacts should be examined for a dirty or poor contact.

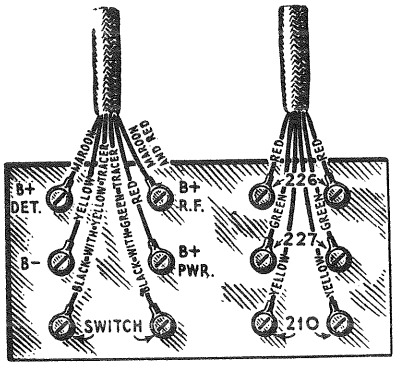

Figure 12—Receptor S. P. U. terminal board and color of connections

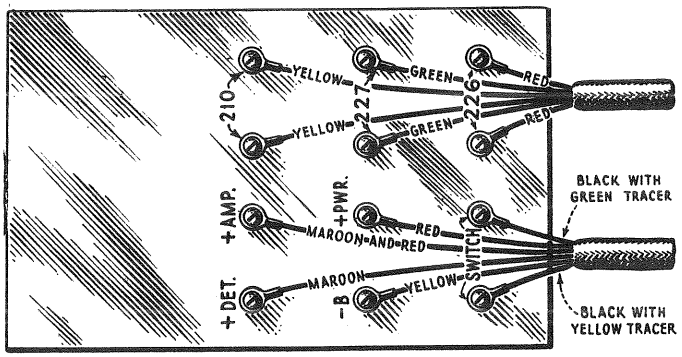

Figure 13—Sterling S. P. U. terminal board showing color scheme of connections

[12] UNCONTROLLED OSCILLATION

Should Radiola 41 oscillate or regenerate at any point in the tuning range the trouble is probably caused by:

(a) Defective grid resistor in second or third R. F. stages. The resistors may be checked by means of a resistance bridge, or the voltmeter ammeter method described below. Figure 6 shows the correct value of these resistors.

(b) Open ground connection. Make repair.

(c) High resistance ground. Connect the ground lead to a cold water pipe, a hot water or steam radiator or both. If these are not available connect to several other grounds until a fairly low resistance ground is obtained.

(d) Open UX-226 bias lead. Make any repair necessary.

(e) Open ground lead in set. Any of the several grounding leads in the Receiver and S. P. U. Assembly being open may cause oscillation. Test for open connections and make repair.

(f) Antenna and ground leads reversed, either at their point of connection to the volume control or outside of the set. Connect properly.

In the case of (a) the grid resistance of Radiola 41 may be checked by means of a resistance bridge. If a resistance bridge is not available the voltmeter-ammeter method gives accurate results provided the meters used are calibrated accurately. This method makes

use of a milliammeter with a scale of 0-25 and a voltmeter of 0-7. A voltage is then applied that will give a substantial reading. A circuit diagram of this method is shown in Figure 9.

The resistance may then be calculated by the use of Ohms law.

$$R = \frac{E}{I} \left(\begin{matrix} \text{Where R equals ohms} \\ \text{E equals volts and I equals amperes} \end{matrix} \right) \text{ or } 1000 \frac{\text{Volts}}{\text{Milliamperes}}$$

Since the current reading is taken in milliamperes (or $\frac{1}{1000}$ ampere) it is necessary to multiply by 1000 to get the resistance value in ohms.

Where everything tests O. K. and the Radiola still oscillates, the following remedy should be applied:

Connect an 800-ohm fixed resistance in series with the plate supply to all Radiotrons UX-226. This will reduce the plate voltage to these tubes and should prevent any oscillation. If, however, the oscillation continues, do not put the resistor in the plate supply to the UX-226 Radiotrons, but connect it across the primary of the second R. F. transformer This will effectively prevent any case of oscillation.

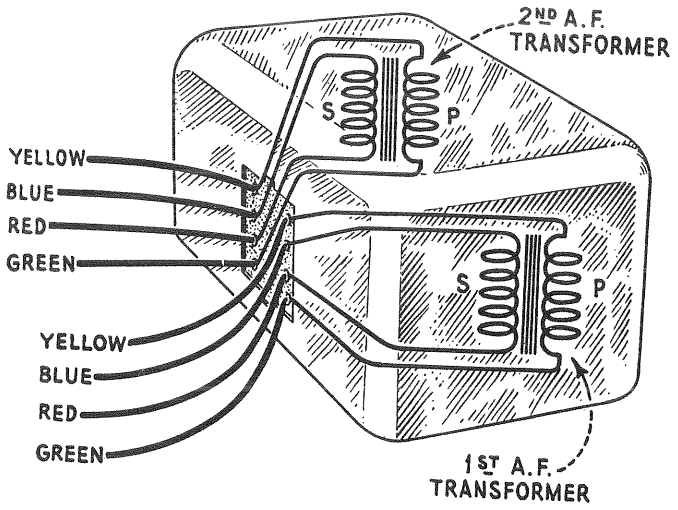

Figure 14—Internal connections of A. F. transformers

[13] ACOUSTIC HOWL

Microphonic or acoustic howling may be corrected by interchanging the tubes in the receiver assembly. This can be done with Radiotrons UX-226. If this does not eliminate the howl try changing the detector Radiotron UY-227 with another of the same type A tube that is unsatisfactory in one set may be O. K. in another.

[14] TESTING FILTER AND BY-PASS CONDENSERS

The filter and by-pass condensers in Radiola 41 can be checked by noting the voltage readings given in Part II, Section 20. A no-voltage reading at any position will indicate a shorted condenser or an open resistance unit. The resistance unit can be checked by the continuity tests given in Part II, Section 19. After determining that the resistance units are not a fault, the individual condensers should be tested by removing all connections and charging them and then noting their ability to retain the charge. Figures 16 and 17 show the interior connections of the condenser banks. The condensers should be discharged by shorting their terminals with a screwdriver. A defective condenser will not hold its charge. If it is completely short-circuited a flash at the condenser terminals will occur when an attempt is made to charge it.

[15] TESTING DISC RECTIFIER

The disc rectifier may be checked by measuring the output voltage that is delivered to the field of the reproducer unit. This should be approximately 80 volts with the field connected. With the field disconnected it should rise slightly to about 95 volts.

Precaution—The operation of the disc rectifier depends on the pressure to which the discs are held. *Do not* loosen the bolts that hold them together as it is highly improbable they can be returned to normal operation without special instruments. Should replacement become necessary, remove the bracket and unit together. The replacement part is supplied with brackets so that replacement is comparatively easy.

[16] REPRODUCER UNIT

Radiola 41 uses a new type eight-inch dynamic reproducer, similar to that used in Loudspeaker 106. The cone is an eight-inch corrugated type, giving a smooth response to all frequencies and having a treatment to make it weatherproof and free from rattle.

A check on the continuity of the cone coil or field can be made by disconnecting them from all other terminals and click testing for continuity. An open of either coil will indicate a defect which must be remedied by replacing the entire cone or the field coil. Also check either of the coils or their connections for shorts. The color scheme of connections of the reproducer and rectifier assembly is shown in Figure 10.

[17] CENTERING CONE OF REPRODUCER UNIT

To properly center a new cone or one out of center (Figure 11) use the following procedure:

(a) Remove reproducer assembly from cabinet as described in Part III, Section 2.

(b) Loosen center screw of cone, but do not remove it.

(c) Insert three cardboard strips about the thickness of a visiting card, 1½ inches by ¼ inch in size, through the center web of the cone into the space between the pole piece and the cone. This will give the cone coil the same clearance on all sides of the pole piece.

(d) Tighten the center screw holding the web of the cone and remove the three strips The cone is now properly centered. Replace the reproducer assembly in the cabinet in the reverse manner of that used to remove it.

[18] OBTAINING ACCESS TO S. P. U. TERMINAL BOARDS

In order to make voltage readings or click tests at the S. P. U. terminal boards it is first necessary to uncover them. The Receptor S. P. U. terminal board (Figure 12) is uncovered by removing the guard held in place by two machine screws. In the Sterling S. P. U. (Figure 13), however, the procedure is more involved. A step-by-step procedure follows:

(a) Remove the rear cabinet panel, which is fastened by two wood screws.

(b) Remove the four screws on the sides of the S. P. U. near the top.

(c) The S. P. U. cover can now be removed by pushing the two sides together so that the small catches are released and lifting the cover. The terminal board is now accessible and any tests necessary may be made.

(d) To return the cover, just place top on S. P. U. and push down. It will snap in place easily. The four screws should then be replaced and the rear cabinet panel returned to its normal position.

[19] RADIOLA 41 CONTINUITY TESTS

The following tests will show complete continuity for the receiver assembly and socket power unit of Radiola 41. Access may be gained to the S. P. U. terminal boards as described in Part II, Section 18.

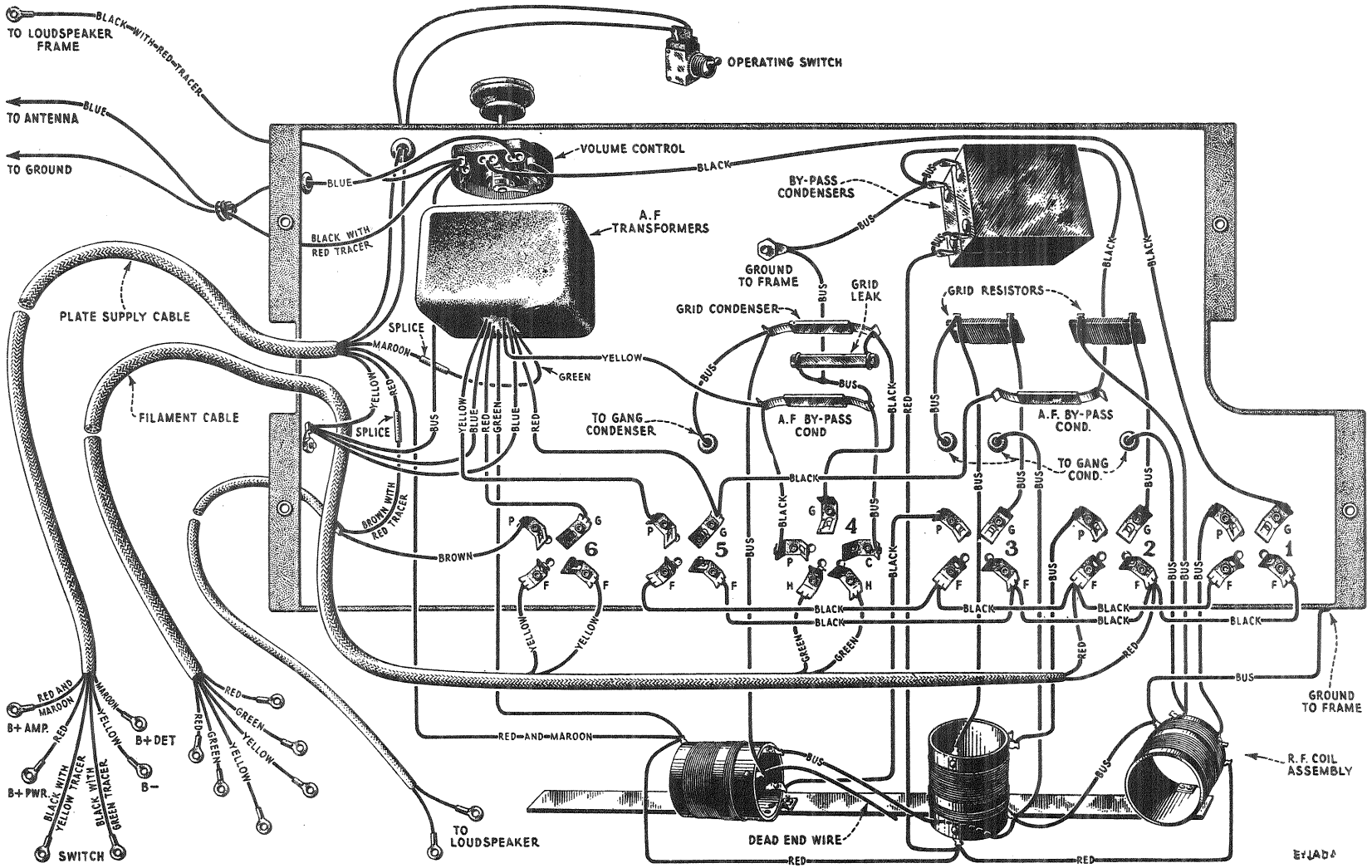

Figure 15—Wiring diagram of receiver assembly

RECEIVER ASSEMBLY CONTINUITY TESTS

Remove all Radiotrons and the cables connected to the S. P. U. terminal board. See Figure 6 for lug numbers, and Figure 15 for socket numbers.

Circuit	*Terminals*	*Correct Effect*	*Incorrect Effect Caused by*
Grid	Ant. to ground	Closed	Open volume control
	G1 to ground	Closed	Open volume control or contact arm
	G2 to ground	Closed	Open secondary of 1st R. F. transformer or grid resistor
	G3 to ground	Closed	Open secondary of 2nd R. F. transformer or grid resistor
	Stator Condenser No. 3 to ground	Closed	Open secondary of 3rd R. F. transformer
	G5 to ground	Closed	Open secondary of 1st A. F. transformer
	G6 to ground	Closed	Open secondary of 2nd A. F. transformer
Plate	P1 to Lug No. 2	Closed	Open primary of 1st R. F. transformer
	P2 to Lug No. 2	Closed	Open primary of 2nd R. F. transformer
	P3 to Lug No. 2	Closed	Open primary of 3rd R. F. transformer
	P4 to Lug No. 3	Closed	Open primary of 1st A. F. transformer
	P5 to Lug No. 2	Closed	Open primary of 2nd A. F. transformer
	P6 to Lug No. 1 (Loudspeaker connected)	Closed	Open primary of output transformer
Filament	One filament contact of sockets Nos. 1, 2, 3 and 5 to Lug No. 9	Closed	Open connection
	Other filament contact of sockets Nos. 1, 2, 3 and 5 to Lug No. 10	Closed	Open connection
	One filament contact of socket No. 4 to Lug No. 8	Closed	Open connection
	Other filament contact of socket No. 4 to Lug No. 7	Closed	Open connection
	One filament contact of socket No. 6 to Lug No. 5	Closed	Open connection
	Other filament contact of socket No. 6 to Lug No. 6	Closed	Open connection
Misc.	Lug No. 10 to Lug No. 11	Closed or Open	Throw operating switch to each position. Circuit should test "closed" when switch is "on" and "open" when switch is "off"
	Across Loudspeaker cone coil connections (Cone coil disconnected)	Closed	Open secondary of output transformer
	P4 to ground	Open	Shorted detector by-pass condenser
	Lug No. 2 to ground	Open	Shorted 2 mfd. by-pass condensers
	Lug No. 4 to ground	Closed	Open connection

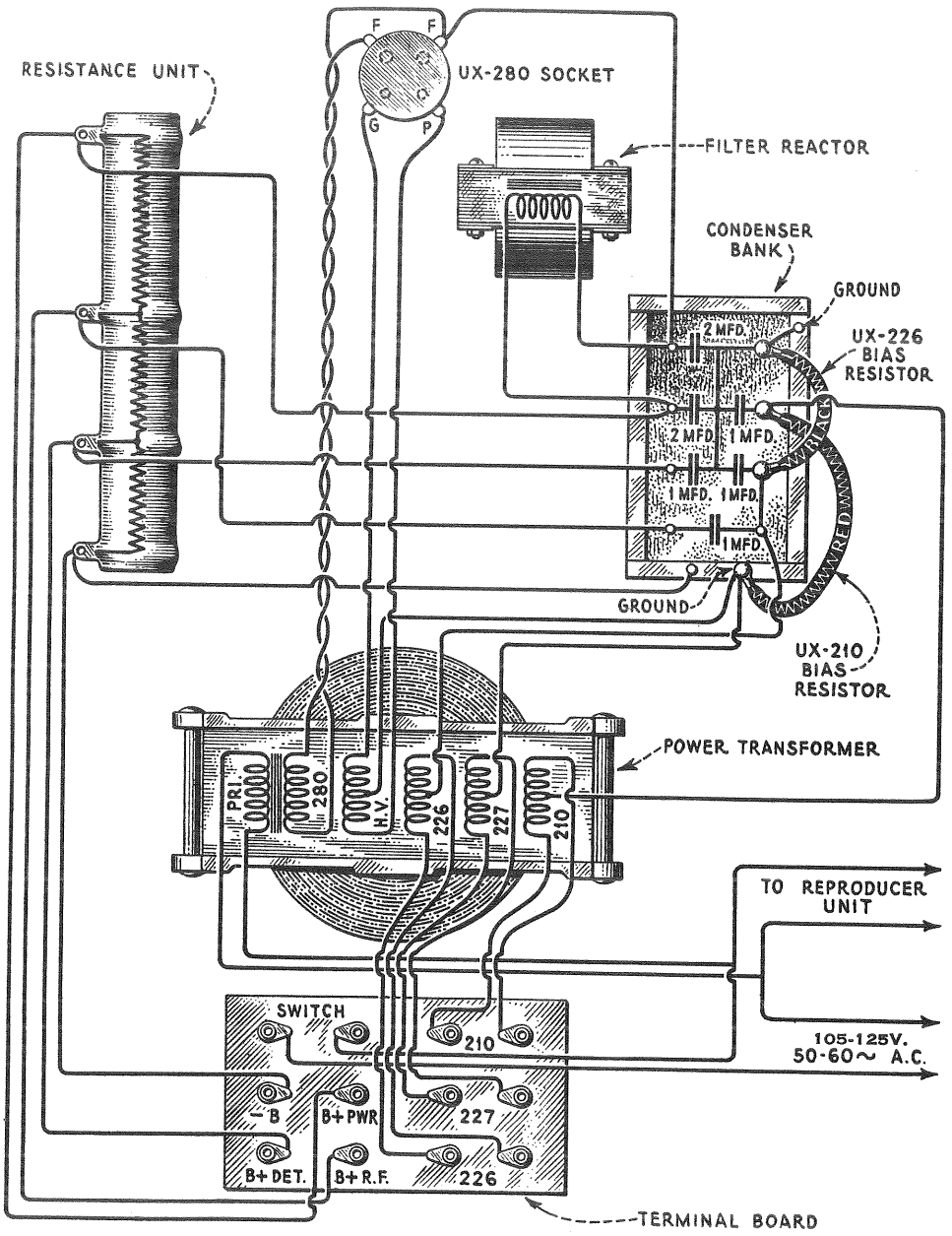

Figure 16—Wiring diagram of the Receptor S. P. U.

S. P. U. CONTINUITY TESTS—Receptor—Figure 16—See Figure 8 for terminal numbers

Terminals	*Correct Effect*	*Incorrect Effect Caused by*
Across UX-280 filament contacts	Closed	Open UX-280 filament winding
G to P of UX-280 socket	Closed	Open high voltage winding of power transformer
1 to either filament contact of UX-280 contact	Closed	Open filter reactor
1 to 4	Closed	Open voltage dividing resistance
5 or 6 to 4	Closed	Open UX-210 grid bias resistor
5 to 6	Closed	Open UX-210 filament winding
7 to 8	Closed	Open UY-227 filament winding
9 or 10 to 4	Closed	Open UX-226 grid bias resistor
9 to 10	Closed	Open UX-226 grid filament winding
11 to 12	Open	Shorted wiring

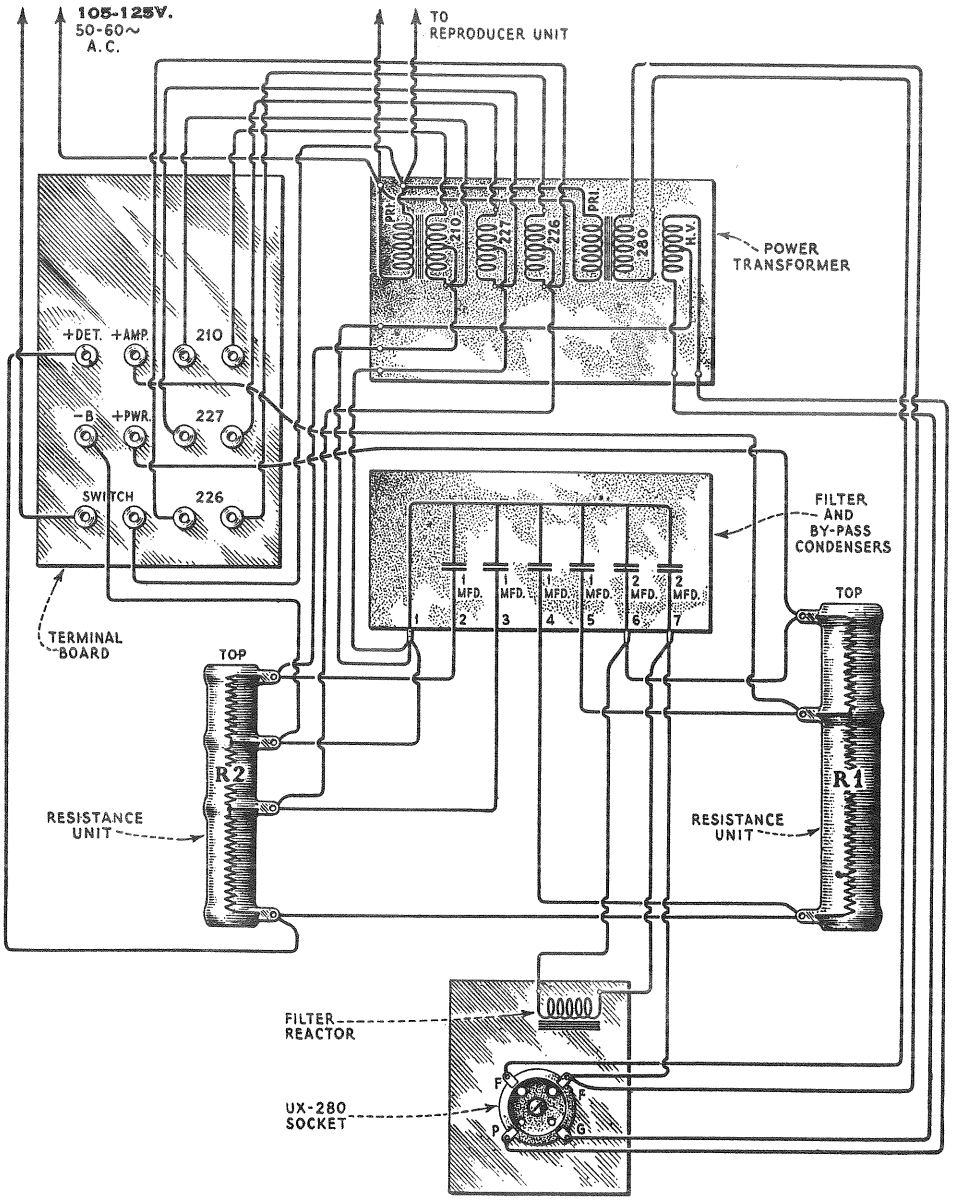

Figure 17—Wiring diagram of Sterling S. P. U.

S. P. U. CONTINUITY TESTS—Sterling—Figure 17—See Figure 7 for terminal numbers		
Terminals	*Correct Effect*	*Incorrect Effect Caused by*
Across UX-280 filament contacts	Closed	Open UX-280 filament winding
G to P of UX-280 socket	Closed	Open high voltage winding of power transformer
1 to either filament contact of UX-280 contact	Closed	Open filter reactor
1 to 3	Closed	Open Resistor R1 (3 Terminals)
3 to 5 or 6	Closed	Open Resistor R2 (4 Terminals)
5 to 6	Closed	Open UX-210 filament winding
7 to 8	Closed	Open UY-227 filament winding
9 to 10	Closed	Open UX-226 filament winding
11 to 12	Open	Shorted wiring

[20] VOLTAGE READINGS

When checking Radiola 41 for possible defects it is good practice to check the voltage of the various sources of current. To do this a service man will need both an A. C. and D. C. voltmeter, the D. C. meter being 600 ohms per volt or higher in resistance. The following voltages at the terminal strip of the S. P. U. are correct with all tubes in place and the Radiola connected to a 115-volt A. C. line. The tubes must be in good condition, otherwise the D. C voltages will be high.

VOLTAGE READINGS AT S. P. U. TERMINAL STRIP

The S. P. U. cover must be removed to expose the terminal strip

Sterling—Figure 13	
Terminals	*Volts*
—B to B+ Det.	25 D. C.
—B to B+ Amp.	135 D. C.
—B to B+ PWR.	320 D. C.
UX-210 Filament	7.5 A. C.
UY-227 Filament	2.5 A. C.
UX-226 Filament	1.5 A. C.

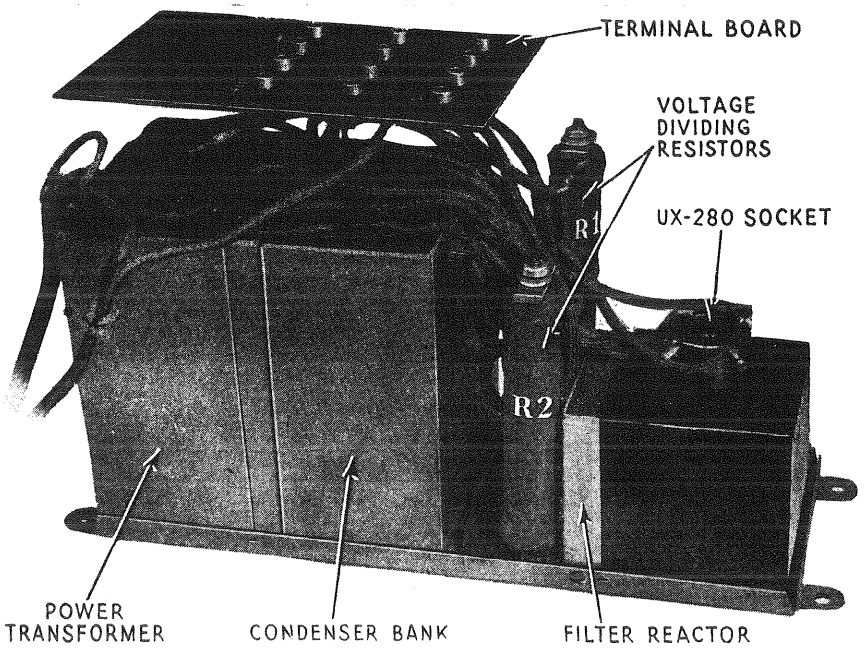

Figure 18—Sterling socket power unit showing parts

Receptor—Figure 12	
Terminals	*Volts*
—B to B+ Det.	33 D. C.
—B to B+ R. F.	100 D. C.
—B to B+ PWR.	335 D. C.
UX-210 Filament	7.5 A. C.
UY-227 Filament	2.5 A. C.
UX-226 Filament	1.5 A. C.

VOLTAGE READINGS AT RADIOTRON SOCKETS

Taken with Weston Model 537 Type 2 test set or others giving similar readings,—115-volt A. C. line and volume control at zero—No station tuned in. For tube numbers refer to Figure 4.

Sterling				
Tube No.	*Filament to Grid Volts*	*Cathode or Filament to Plate Volts*	*Plate Current Millamps*	*Filament or Heater Voltage*
1	10	125	3.5	1.5
2	10	125	3.5	1.5
3	10	125	3.5	1.5
4	—	25	2.0	2.5
5	10	125	3.5	1.5
6	20	300	16.0	7.5

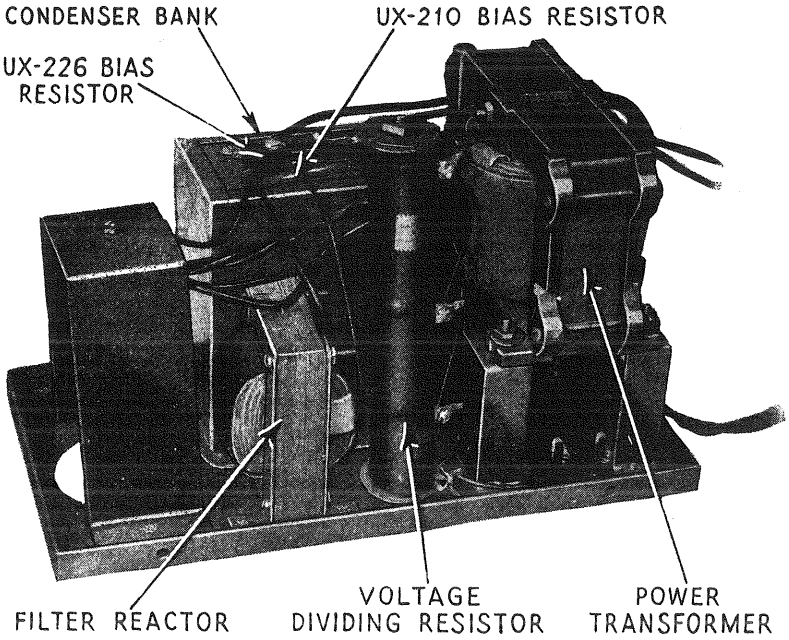

Figure 19—Receptor socket power unit showing parts

Receptor				
Tube No.	*Filament to Grid Volts*	*Cathode or Filament to Plate Volts*	*Plate Current Millamps*	*Filament or Heater Voltage*
1	7	93	2.5	1.5
2	7	93	2.5	1.5
3	7	93	2.5	1.5
4	—	33	2.0	2.5
5	7	93	2.5	1.5
6	22	310	16.0	7.5

PART III—MAKING REPLACEMENTS

The various assemblies and parts of Radiola 41 are readily accessible and replacements can be easily made. Figure 2 illustrates the parts in the receiver assembly, Figure 19 the Receptor S. P. U. and Figure 18 the Sterling S. P. U. The following procedure outlines the simplest method to be used when making replacements.

[1] REPLACING PARTS IN RECEIVER ASSEMBLY

Should it be necessary to replace any part in the receiver assembly proceed as follows:

(a) Remove terminal board covers as described in Part II, Section 18.

(b) Release the two receiver assembly cables from their terminal board and pull them clear of the S. P. U. container.

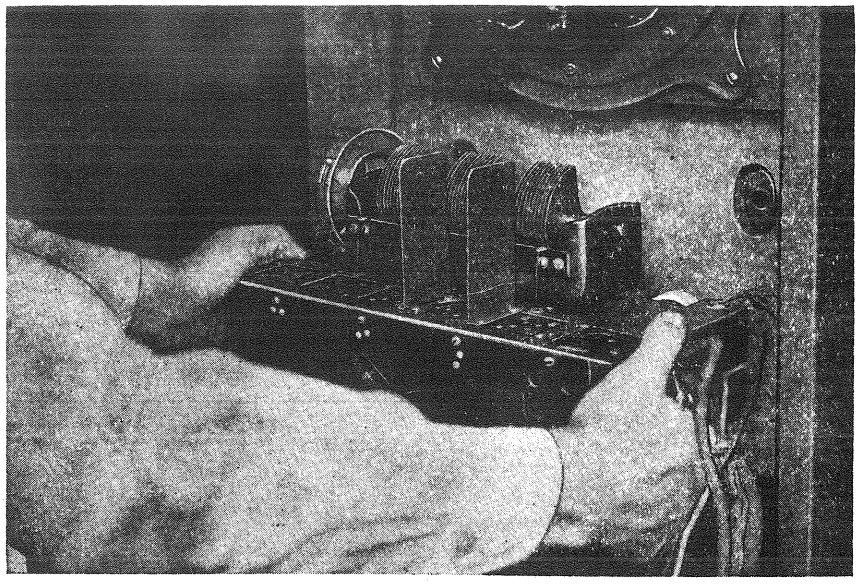

Figure 20—Removing receiver assembly from cabinet

(c) Release the antenna and ground leads from the clamps that hold them in place.

(d) Release the ground lead to the reproducer unit frame.

(e) Release the output leads from the receiver assembly to the output transformer on the loudspeaker frame. These leads must also be released from the clamps that hold them to the sides of the cabinet.

(f) Remove the collar that holds the operating switch in place. Pull it clear from the escutcheon.

(g) Remove the two knobs on the front panel—the station selector and volume control.

(h) Remove the four screws that hold the receiver assembly on its shelf. It may now be lifted clear and placed in a position convenient for work (Figure 20). The parts are readily accessible and any repair or replacement may be easily made. The correct connections to all parts are shown in Figure 15.

(i) After all work is completed the receiver assembly should be returned to the cabinet in the reverse manner of that used to remove it.

[2] REPLACING PARTS IN LOUDSPEAKER ASSEMBLY

To replace a part in the loudspeaker assembly (Figure 21) proceed as follows:

(a) Disconnect the A. C. input connections to the disc rectifiers.

(b) Disconnect the receiver output leads to the terminal on the reproducer frame.

(c) Remove the four bolts that hold the reproducer assembly to the baffle board. It may be lifted clear and placed in a position convenient for work. After the necessary repairs or replacements are made it should be returned in the reverse manner of that used to remove it. When attaching the reproducer assembly to the baffle board be sure to have the ground lead from the receiver assembly fastened under one of the bolts holding the reproducer in place.

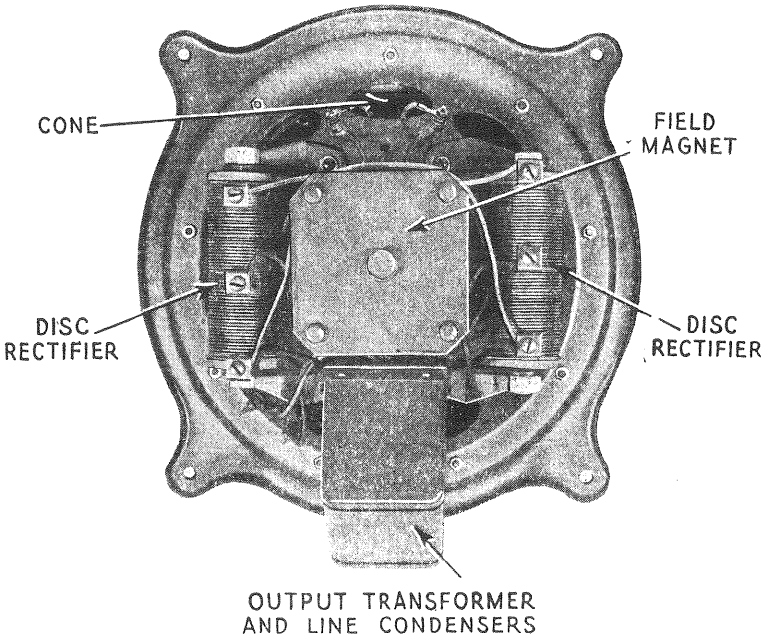

Figure 21—Reproducer assembly showing parts

[3] REPLACING PARTS IN STERLING S. P. U.

To replace any parts in the Sterling S. P. U. (Figure 18) proceed as follows:

(a) Gain access to the S. P. U. terminal board as described in Part II, Section 18

(b) Release the cables connected to the S. P. U. terminal board. Also release the two A. C. input leads from the S. P. U. to the disc rectifier at its connection to the rectifier.

(c) Release the machine screws and brackets that hold the S. P. U. to the cabinet. It may now be lifted clear and placed in a position for work.

(d) Release the four machine screws that hold the terminal board in place.

(e) Release the four machine screws that hold the bottom of the container to its sides.

(f) Push the terminal board a small distance toward the UX-280 socket. Now push the side of the container together so that it releases from the bottom. The side may now be pulled back on the input A. C. cord so that all the parts of the S. P. U. are exposed for any necessary repair or replacement.

(g) After all work is finished the S. P. U. can be reassembled and replaced in the cabinet in the reverse manner of that used to remove it.

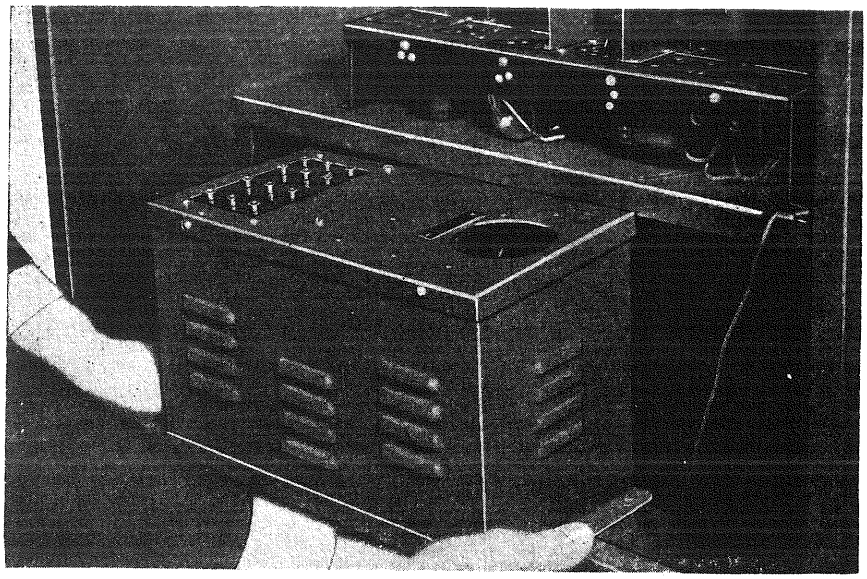

Figure 22—Removing Receptor S. P. U. from cabinet

[4] REPLACING PARTS IN RECEPTOR S. P. U.

To make replacements in the Receptor S. P. U. (Figure 22), proceed as follows:

(a) Remove terminal board cover as described in Part II, Section 18.

(b) Remove the two cables attached to the S. P. U. terminal board.

(c) Release the A. C. cord from the S. P. U. to the disc rectifier on the reproducer. Take the plug from the A. C. input cord so that it may be pulled clear.

(d) Remove the four machine screws that hold the top of the S. P. U. to the container.

(e) The top of the S. P. U. to which all apparatus is attached may be pulled clear and placed in a position convenient for work.

After all repairs or replacements are completed it should be returned to the container and reconnected in the reverse manner of that used to remove it.

SERVICE DATA CHART

Before using the following Service Data Chart, when experiencing no signals, weak signals, poor quality, noisy or intermittent reception, howling and fading, first look for defective tubes, or a poor antenna system. If imperfect operation is not due to these causes the "Service Data Chart" should be consulted for further detailed causes. Reference to Part No. and Section No. in the "Service Notes" is also noted for further details.

Indication	*Cause*	*Remedy*
No Signals	Defective operating switch	Repair or replace switch
	Loose volume control arm	Tighten volume control arm, P. II, S. 4
	Defective power cable	Replace power cable, P. III, S. 1
	Defective R. F. transformer	Replace R. F. transformer assembly, P. III, S. 1
	Defective A. F. transformer	Replace A. F. transformer assembly, P. III, S. 1
	Defective By-pass condenser	Replace By-pass condenser, P. III, S. 1
	Defective socket power unit	Check socket power unit by means of continuity test and make any repairs or replacements necessary, P. II, S. 19
	Open grid resistor	Replace grid resistor, P. III, S. 1
	Open cone coil of reproducer unit	Check cone coil—if open replace cone, P. II, S. 16
	Grounded input terminals to loudspeaker	Check for grounds, P. II, S. 9
Weak Signals	Defective power cable	Repair or replace cable, P. III, S. 1
	Defective line switch	Clean contacts or replace line switch
	Defective R. F. transformer	Replace R. F. transformer assembly, P. III, S. 1
	Defective A. F. transformer	Replace A. F. transformer assembly, P. III, S. 1
	Dirty Radiotron prongs	Clean prongs with fine sandpaper, P. II, S. 3
	Defective By-pass condenser	Replace defective By-pass condenser, P. III, S. 1
	Defective main tuning condensers	Replace defective tuning condensers, P. III, S. 1
	Defective output transformer	Replace defective transformer, P. III, S. 2
	Low voltages from socket power unit	Check socket power unit voltages with high resistance D. C. voltmeter and A. C. voltmeter, P. II, S. 20
	Defective socket power unit	Check socket power unit by means of continuity test and make any repairs or replacements necessary, P. II, S. 19
	Defective rectifier unit	Replace defective unit, P. III, S. 2
Poor Quality	Defective A. F. transformer	Replace A. F. transformer assembly, P. III, S. 1
	Defective output transformer	Replace output transformer, P. III, S. 2
	Defective By-pass condenser	Replace defective By-pass condenser, P. III, S. 1
	Dirty contact arm of volume control	Clean contact arm on volume control, P. II, S. 4
	Dirty prongs on Radiotrons	Clean prongs with fine sandpaper, P. II, S. 3
Howling	Defect in audio system	Check and repair any defect, P. II, S. 10
	Open grid circuit in any stage	Check circuits and repair defect, P. II, S. 19
	Microphonic Radiotrons	Interchange Radiotrons, P. II, S. 10
Excessive Hum	Socket plug position	Reverse socket plug
	Dirty or defective line switch	Clean or replace line switch
	Antenna and ground leads reversed	Connect antenna and ground leads correctly, P. II, S. 7
	Defective disc rectifier	Replace defective unit, P. III, S. 2
Radiotrons fail to light	Operating switch not "On"	Turn operating switch "On"
	Defective operating switch	Replace operating switch
	Defective input A. C. cord	Repair or replace A. C. input cord
	Defective power transformer	Replace power transformer, P. III, S. 3-4
	No A. C. line voltage	Turn A. C. line voltage "On"


RCA